

**ABSTRACT**

The invention provides methods of controllably making a vinyl polymer hydrogel having desired physical properties without chemical cross-links or radiation. The invention also provides methods of manufacturing a vinyl polymer hydrogel and the process steps including providing a vinyl polymer solution, heating the vinyl polymer solution, mixing the vinyl polymer solution with a gellant, inducing gelation of the mixture of vinyl polymer solution and gellant, and controlling the gelation rate to form a viscoelastic solution for the vinyl polymer hydrogel having the desired physical property. Physically cross-linked hydrogels produced by controlled gelation of viscoelastic solution, kits for use in repairing intervertebral disks or articulated joints, including components that form the vinyl polymer hydrogel and a dispenser, also are provided.